

Claims

- [c1] An integral block, connectable to a chemical delivery system for delivering an ultrapure chemical from a liquid chemical container to a point of use in a semiconductor or a fiber optical manufacturing process, wherein said integral block is a chemical container block for containing an ultrapure chemical, a recharge container block for recharging a container, a pressurization gas block for providing pressure, a purge gas block for purging a chemical, a waste recovery block for waste recovery, a vacuum block for creating a vacuum, a solvent supply block for supplying a solvent, a degas block for degassing a chemical, a filtration block for filtering a chemical or combinations thereof, wherein the integral block is prefabricated,
- wherein the chemical container block comprises:
- (i) a first chemical container connection joint adapted to be attached to a pressurized gas source;
 - (ii) a sealed chemical container;
 - (iii) a second chemical container connection joint adapted to be attached to an integral block;
 - (iv) a chemical container inlet conduit connected between the first chemical container connection joint and the sealed chemical container to deliver a pressurized gas to the sealed chemical container;
 - (v) a chemical container delivery conduit connected between the sealed chemical container and the second chemical container connection joint, to deliver an ultrapure chemical to a point of use or an integral block,
 - (vi) a chemical container bypass conduit connected between the chemical container inlet conduit and the chemical container delivery conduit,
 - (vii) optionally, a chemical container discharge conduit connected in line with the chemical container inlet conduit or the chemical container delivery conduit, and
 - (viii) a chemical container level indicator for monitoring the level in the sealed chemical container,
- wherein the chemical container inlet conduit comprises:
- a first chemical container joint adapted for the removal of the sealed container, and

a first chemical container isolation valve connected between the first connection joint and the sealed container, and

wherein the chemical container delivery conduit comprises:

a chemical container diptube with a first end extending into the sealed chemical container,

a second chemical container isolation valve connected between the second chemical container connection joint and the sealed chemical container, and

a second chemical container joint adapted for the removal of the sealed chemical container, connected between the second chemical container connection joint and the sealed chemical container, and

wherein the chemical container discharge conduit comprises:

a fifth chemical container connection joint, and

a chemical container control valve connected in line with the fifth chemical container connection joint and the chemical container inlet conduit or the chemical container delivery conduit;

wherein the recharge container block comprises:

(i) a first recharge container connection joint adapted to be attached to an integral block,

(ii) a sealed recharge container,

(iii) a recharge container chemical inlet conduit connected between the first recharge container connection joint and sealed recharge container to deliver an ultrapure chemical to the sealed recharge container,

(iv) a second recharge container connection joint adapted to be attached to an integral block,

(v) a gas conduit connected between the second recharge container connection joint and sealed recharge container to deliver a pressurized gas to the sealed recharge container,

(vi) a third recharge container connection joint adapted to be attached to an integral block,

(vii) a recharge container chemical delivery conduit connected between the third recharge container connection joint and sealed recharge container to deliver chemicals to a point of use or an integral block, and

(viii) a recharge container level monitor for monitoring the level in the sealed recharge container,

wherein the recharge container chemical inlet conduit comprises:

a first recharge container control valve connected between the first recharge container connection joint and the sealed recharge container, a first recharge container joint connected between the first recharge container connection joint and the sealed recharge container, and a first recharge container isolation valve connected between the first recharge container connection joint and the sealed recharge container,

wherein the gas conduit comprises:

a fourth recharge container connection joint adapted to be attached to an integral block, connected between the second recharge container connection joint and the sealed recharge container, a needle valve connected between the second recharge container connection joint and the sealed recharge container, a second control valve connected between the second recharge container connection joint and the sealed recharge container, a second recharge container joint connected between the second recharge container connection joint and the sealed recharge container, and a second recharge container isolation valve connected between the second recharge container connection joint and the sealed recharge container, and

wherein the recharge container chemical delivery conduit comprises:

a third recharge container control valve connected between the third connection joint and the sealed container, a third recharge container joint adapted for the removal of the sealed container, connected between the third connection joint and the sealed container, a third recharge container isolation valve connected between the third recharge container connection joint and the sealed recharge container, a fourth recharge container isolation valve connected between the third recharge container connection joint and the sealed recharge container, a port connected between the third recharge container connection joint

and the sealed recharge container, and
a diptube with a first end extending into the sealed recharge container
and in line with the recharge container chemical delivery conduit;
wherein the pressurization gas block comprises:

- (i) a first pressurization gas block connection joint adapted to receive an inert gas;
- (ii) at least one pressurization gas block gas conduit;
- (iii) a pressurization gas block isolation valve connected between said first pressurization gas block connection joint and said pressurization gas block gas conduit;
- (iv) a pressurization gas block regulator connected between said first pressurization gas block connection joint and said pressurization gas block gas conduit;
- (v) a pressurization gas block filter connected between said first pressurization gas block connection joint and said pressurization gas block gas conduit;
- (vi) a first pressurization gas block pressure sensor connected between said first pressurization gas block connection joint and said pressurization gas block gas conduit, and
- (vii) a pressurization gas block check valve connected between said first pressurization gas block connection joint and said pressurization gas block gas conduit, and

wherein the at least one pressurization gas block gas conduit comprises:

- a second pressurization gas block connection joint adapted to be attached to an integral block,
- a pressurization gas block needle valve optionally connected between said second pressurization gas block connection joint and said check valve,
- a pressurization gas block control valve connected between said second pressurization gas block connection joint and said pressurization gas block check valve, and
- a second pressurization gas block pressure sensor connected between said second pressurization gas block connection joint and said pressurization gas block check valve;

wherein the purge gas block comprises:

- (i) a first purge gas connection joint adapted to be connected to a first integral block,
- (ii) at least one purge gas conduit,
- (iii) an purge gas isolation valve connected between the first purge gas connection joint and purge gas conduit,
- (iv) a pressure regulator connected between the first purge gas connection joint and purge gas conduit,
- (v) a purge gas filter connected between the first purge gas connection joint and purge gas conduit,
- (vi) a purge gas control valve connected between the first purge gas connection joint and purge gas conduit,
- (vii) a purge gas check valve connected between the first purge gas connection joint and purge gas conduit,
- (viii) a purge gas pressure sensor connected between the first purge gas connection joint and purge gas conduit, and
- (ix) a purge gas flow restriction orifice connected around the purge gas control valve, and

wherein the purge gas conduit comprises:

- at least one second purge gas connection joint adapted to be connected to a second purge gas integral block, and
- at least one purge gas control valve, connected between the first purge gas connection joint and the second purge gas connection joint;

wherein the waste recovery block comprises:

- (i) a first waste recovery connection joint adapted to receive waste from at least one integral block,
- (ii) a sealed waste recovery container,
- (iii) a waste recovery inlet connected between the sealed waste recovery container and the first waste recovery connection joint,
- (iv) a second waste recovery connection joint adapted to be attached to an integral block,
- (v) a waste exhaust connected between the sealed waste recovery container and the second waste recovery connection joint,

(vi) a first waste recovery control valve connected between the waste inlet and the waste exhaust, and

(vii) a waste recovery level indicator for monitoring the level in the sealed waste recovery container, and

wherein the waste inlet comprises:

a second waste recovery control valve connected between the first waste recovery connection joint and the sealed waste recovery container,

a first waste recovery container joint connected between the first waste recovery connection joint and the sealed waste recovery container, and

a first waste recovery isolation valve connected between the first waste recovery connection joint and the sealed waste recovery container, and

wherein the waste exhaust comprises:

a second waste recovery isolation valve connected between the second waste recovery connection joint and the sealed waste recovery container,

a second waste recovery container joint connected between the second waste recovery connection joint and the sealed waste recovery container, and

a third waste recovery control valve connected between the second waste recovery connection joint and the sealed waste recovery container;

wherein the vacuum block comprises:

(i) a vacuum generator,

(ii) a first vacuum block control valve in line with the vacuum generator, and

(iii) at least one vacuum conduit adapted to provide a vacuum and in line with the vacuum generator, and

wherein the vacuum conduit comprises

a vacuum block connection joint adapted to be attached to at least one integral block, and

a second vacuum block control valve connected between the connection joint and the vacuum generator;

wherein the solvent supply block comprises:

(i) a first solvent supply connection joint adapted to be connected to a first integral block,

- (ii) a sealed solvent supply container,
- (iii) a pressurization solvent supply gas inlet connected between the first solvent supply connection joint and the sealed container,
- (iv) a second solvent supply connection joint adapted to be connected to a second integral block,
- (v) a solvent supply delivery outlet connected between the second connection joint and the sealed container,
- (vi) a solvent supply control valve connected between the solvent supply pressurization gas inlet and the solvent supply delivery outlet, and
- (vii) a solvent supply level indicator for monitoring the level in the sealed container,

wherein the pressurization gas inlet comprises:

- a first solvent supply container joint connected between the first connection joint and the sealed container,
- a second control solvent supply valve connected between the first solvent supply connection joint and the sealed solvent supply container, and
- a first solvent supply isolation valve connected between the first solvent supply connection joint and the sealed solvent supply container, and

wherein the solvent supply delivery outlet comprises:

- a solvent supply diptube with one end extending into the sealed container,
- a second solvent supply isolation valve connected between sealed solvent supply container and the second solvent supply connection joint,
- a second solvent supply container joint connected between sealed solvent supply container and the second solvent supply connection joint,
- a third solvent supply control valve connected between sealed solvent supply container and the second solvent supply connection joint, and
- a fourth solvent supply control valve connected between sealed solvent supply container and the second solvent supply connection joint;

wherein the degas block comprises:

- (i) a first degas block connection joint adapted to be attached to an integral block;
- (ii) a second degas block connection joint adapted to be attached to an

integral block;

- (iii) a degas block chemical inlet conduit comprising a first degas block isolation valve and connected between the first degas block connection joint and the second degas block connection joint,
- (iv) a membrane cartridge connected between the first degas block connection joint and the second degas block connection joint,
- (v) a degas block chemical outlet conduit comprising a second degas block isolation valve and connected between the first degas block connection joint and the second degas block connection joint, and
- (vi) a degas block control valve connected between the membrane cartridge and the second degas block connection joint; and

wherein the filtration block comprises:

- (i) a first filtration block connection joint adapted to be connected to a first integral block,
- (ii) a second filtration block connection joint adapted to be connected to a second integral block, and
- (iii) at least one filtration conduit connected between the first filtration block connection joint and the second filtration block connection joint,

wherein the filtration conduit comprises:

- a first filtration block isolation valve connected between the first filtration block connection joint and the second filtration block connection joint,
- a filter connected between the first filtration block connection joint and the second filtration block connection joint, and
- a second filtration block isolation valve connected between the first filtration block connection joint and the second filtration block connection joint.

[c2] An integral block of claim 1, wherein the point of use is a vaporizer.

[c3] An integral block of claim 1, wherein the integral block is a chemical container block for delivering an ultrapure chemical to a point of use or to a second integral block.

[c4] An integral block of claim 1, wherein the integral block is a recharge container

block, for receiving chemicals from a chemical container block and delivering chemicals to a point of use or a second integral block.

- [c5] An integral block of claim 1, wherein the integral block is a pressurization gas block.
- [c6] An integral block of claim 5, further comprising an additional gas conduit comprising:
 - a third pressurization gas connection joint adapted to be attached to an integral block, and
 - a second pressurization gas control valve connected between said second connection joint and said check valve.
- [c7] An integral block of claim 1, wherein the integral block is a purge gas block.
- [c8] An integral block of claim 1, wherein the integral block is a waste recovery block.
- [c9] An integral block of claim 1, wherein the integral block is a vacuum block, for providing a vacuum to one or more integral blocks.
- [c10] An integral block of claim 9, wherein the vacuum generator is a venturi or a vacuum pump.
- [c11] An integral block of claim 1, wherein the integral block is a solvent supply block.
- [c12] An integral block of claim 1, wherein the integral block is a degas block, for removing dissolved gas in an ultrapure chemical.
- [c13] An integral block of claim 1, wherein the integral block is a filtration block for removing particles from an ultrapure chemical.
- [c14] A chemical delivery system for delivering an ultrapure chemical from a chemical container to a point of use, comprising:
 - (i) a chemical container block of claim 3;
 - (ii) a chemical delivery block in line with the chemical container block, and
 - (iii) a point of use in line with the chemical container block and the

chemical delivery block.

- [c15] A chemical delivery system of claim 14, wherein the chemical delivery block is the pressurization gas block of claim 5.
- [c16] A chemical delivery system of claim 14, further comprising at least one integral block.
- [c17] A chemical delivery system of claim 16, wherein the at least one integral block is selected from a recharge container block, a pressurization gas block, a purge gas block, a waste recovery block, a vacuum block, a solvent supply block, a degas block, or a filtration block.
- [c18] A chemical delivery system of claim 14, wherein the point of use is a vaporizer.
- [c19] A chemical delivery system of claim 14, wherein the point of use is a manufacturing process tool.
- [c20] A chemical delivery system of claim 14, wherein the point of use is an electronic fabrication tool.
- [c21] A chemical delivery system of claim 14, wherein the point of use is a semiconductor process tool.
- [c22] A chemical delivery system for delivering an ultrapure chemical from a liquid chemical container to a point of use in a semiconductor or a fiber optical manufacturing process, comprising a prefabricated chemical container block for containing an ultrapure chemical, a prefabricated recharge container block for recharging a container, a prefabricated pressurization gas block for providing pressure, a prefabricated purge gas block for purging a chemical, a prefabricated waste recovery block for waste recovery, a prefabricated vacuum block for creating a vacuum, a prefabricated solvent supply block for supplying a solvent, a prefabricated degas block for degassing a chemical, and a prefabricated filtration block for filtering a chemical, and wherein the prefabricated chemical container block comprises:
 - (i) a first chemical container connection joint adapted to be attached to a pressurized gas source;

- (ii) a sealed chemical container;
- (iii) a second chemical container connection joint adapted to be attached to an integral block;
- (iv) a chemical container inlet conduit connected between the first chemical container connection joint and the sealed chemical container to deliver a pressurized gas to the sealed chemical container;
- (v) a chemical container delivery conduit connected between the sealed chemical container and the second chemical container connection joint, to deliver an ultrapure chemical to a point of use or an integral block,
- (vi) a chemical container bypass conduit connected between the chemical container inlet conduit and the chemical container delivery conduit,
- (vii) optionally, a chemical container discharge conduit connected in line with the chemical container inlet conduit or the chemical container delivery conduit, and
- (viii) a chemical container level indicator for monitoring the level in the sealed chemical container,

wherein the chemical container inlet conduit comprises:

- a first chemical container joint adapted for the removal of the sealed container, and
- a first chemical container isolation valve connected between the first connection joint and the sealed container, and

wherein the chemical container delivery conduit comprises:

- a chemical container diptube with a first end extending into the sealed chemical container,
- a second chemical container isolation valve connected between the second chemical container connection joint and the sealed chemical container, and
- a second chemical container joint adapted for the removal of the sealed chemical container, connected between the second chemical container connection joint and the sealed chemical container, and

wherein the chemical container discharge conduit comprises:

- a fifth chemical container connection joint, and
- a chemical container control valve connected in line with the fifth

chemical container connection joint and the chemical container inlet conduit or the chemical container delivery conduit;

wherein the prefabricated recharge container block comprises:

- (i) a first recharge container connection joint adapted to be attached to an integral block,
- (ii) a sealed recharge container,
- (iii) a recharge container chemical inlet conduit connected between the first recharge container connection joint and sealed recharge container to deliver an ultrapure chemical to the sealed recharge container,
- (iv) a second recharge container connection joint adapted to be attached to an integral block,
- (v) a gas conduit connected between the second recharge container connection joint and sealed recharge container to deliver a pressurized gas to the sealed recharge container,
- (vi) a third recharge container connection joint adapted to be attached to an integral block,
- (vii) a recharge container chemical delivery conduit connected between the third recharge container connection joint and sealed recharge container to deliver chemicals to a point of use or an integral block, and
- (viii) a recharge container level monitor for monitoring the level in the sealed recharge container,

wherein the recharge container chemical inlet conduit comprises:

a first recharge container control valve connected between the first recharge container connection joint and the sealed recharge container,
a first recharge container joint connected between the first recharge container connection joint and the sealed recharge container, and
a first recharge container isolation valve connected between the first recharge container connection joint and the sealed recharge container,

wherein the gas conduit comprises:

a fourth recharge container connection joint adapted to be attached to an integral block, connected between the second recharge container connection joint and the sealed recharge container,
a needle valve connected between the second recharge container

connection joint and the sealed recharge container,
a second control valve connected between the second recharge container connection joint and the sealed recharge container,
a second recharge container joint connected between the second recharge container connection joint and the sealed recharge container, and
a second recharge container isolation valve connected between the second recharge container connection joint and the sealed recharge container, and

wherein the recharge container chemical delivery conduit comprises:

a third recharge container control valve connected between the third connection joint and the sealed container,
a third recharge container joint adapted for the removal of the sealed container, connected between the third connection joint and the sealed container,
a third recharge container isolation valve connected between the third recharge container connection joint and the sealed recharge container,
a fourth recharge container isolation valve connected between the third recharge container connection joint and the sealed recharge container,
a port connected between the third recharge container connection joint and the sealed recharge container, and
a diptube with a first end extending into the sealed recharge container and in line with the recharge container chemical delivery conduit;

wherein the prefabricated pressurization gas block comprises:

- (i) a first pressurization gas block connection joint adapted to receive an inert gas;
- (ii) at least one pressurization gas block gas conduit;
- (iii) a pressurization gas block isolation valve connected between said first pressurization gas block connection joint and said pressurization gas block gas conduit;
- (iv) a pressurization gas block regulator connected between said first pressurization gas block connection joint and said pressurization gas block gas conduit;
- (v) a pressurization gas block filter connected between said first

pressurization gas block connection joint and said pressurization gas block gas conduit;

(vi) a first pressurization gas block pressure sensor connected between said first pressurization gas block connection joint and said pressurization gas block gas conduit, and

(vii) a pressurization gas block check valve connected between said first pressurization gas block connection joint and said pressurization gas block gas conduit, and

wherein the at least one pressurization gas block gas conduit comprises:

a second pressurization gas block connection joint adapted to be attached to an integral block,

a pressurization gas block needle valve optionally connected between said second pressurization gas block connection joint and said check valve, a pressurization gas block control valve connected between said second pressurization gas block connection joint and said pressurization gas block check valve, and

a second pressurization gas block pressure sensor connected between said second pressurization gas block connection joint and said pressurization gas block check valve;

wherein the prefabricated purge gas block comprises:

(i) a first purge gas connection joint adapted to be connected to a first integral block,

(ii) at least one purge gas conduit,

(iii) an purge gas isolation valve connected between the first purge gas connection joint and purge gas conduit,

(iv) a pressure regulator connected between the first purge gas connection joint and purge gas conduit,

(v) a purge gas filter connected between the first purge gas connection joint and purge gas conduit,

(vi) a purge gas control valve connected between the first purge gas connection joint and purge gas conduit,

(vii) a purge gas check valve connected between the first purge gas connection joint and purge gas conduit,

(viii) a purge gas pressure sensor connected between the first purge gas connection joint and purge gas conduit, and

(ix) a purge gas flow restriction orifice connected around the purge gas control valve, and

wherein the purge gas conduit comprises:

at least one second purge gas connection joint adapted to be connected to a second purge gas integral block, and

at least one purge gas control valve, connected between the first purge gas connection joint and the second purge gas connection joint;

wherein the prefabricated waste recovery block comprises:

(i) a first waste recovery connection joint adapted to receive waste from at least one integral block,

(ii) a sealed waste recovery container,

(iii) a waste recovery inlet connected between the sealed waste recovery container and the first waste recovery connection joint,

(iv) a second waste recovery connection joint adapted to be attached to an integral block,

(v) a waste exhaust connected between the sealed waste recovery container and the second waste recovery connection joint,

(vi) a first waste recovery control valve connected between the waste inlet and the waste exhaust, and

(vii) a waste recovery level indicator for monitoring the level in the sealed waste recovery container, and

wherein the waste inlet comprises:

a second waste recovery control valve connected between the first waste recovery connection joint and the sealed waste recovery container,

a first waste recovery container joint connected between the first waste recovery connection joint and the sealed waste recovery container, and

a first waste recovery isolation valve connected between the first waste recovery connection joint and the sealed waste recovery container, and

wherein the waste exhaust comprises:

a second waste recovery isolation valve connected between the second waste recovery connection joint and the sealed waste recovery container,

a second waste recovery container joint connected between the second waste recovery connection joint and the sealed waste recovery container, and

a third waste recovery control valve connected between the second waste recovery connection joint and the sealed waste recovery container;

wherein the prefabricated vacuum block comprises:

(i) a vacuum generator,

(ii) a first vacuum block control valve in line with the vacuum generator, and

(iii) at least one vacuum conduit adapted to provide a vacuum and in line with the vacuum generator, and

wherein the vacuum conduit comprises

a vacuum block connection joint adapted to be attached to at least one integral block, and

a second vacuum block control valve connected between the connection joint and the vacuum generator;

wherein the prefabricated solvent supply block comprises:

(i) a first solvent supply connection joint adapted to be connected to a first integral block,

(ii) a sealed solvent supply container,

(iii) a pressurization solvent supply gas inlet connected between the first solvent supply connection joint and the sealed container,

(iv) a second solvent supply connection joint adapted to be connected to a second integral block,

(v) a solvent supply delivery outlet connected between the second connection joint and the sealed container,

(vi) a solvent supply control valve connected between the solvent supply pressurization gas inlet and the solvent supply delivery outlet, and

(vii) a solvent supply level indicator for monitoring the level in the sealed container,

wherein the pressurization gas inlet comprises:

a first solvent supply container joint connected between the first connection joint and the sealed container,

a second control solvent supply valve connected between the first solvent supply connection joint and the sealed solvent supply container, and a first solvent supply isolation valve connected between the first solvent supply connection joint and the sealed solvent supply container, and

wherein the solvent supply delivery outlet comprises:

a solvent supply diptube with one end extending into the sealed container,

a second solvent supply isolation valve connected between sealed solvent supply container and the second solvent supply connection joint,

a second solvent supply container joint connected between sealed solvent supply container and the second solvent supply connection joint,

a third solvent supply control valve connected between sealed solvent supply container and the second solvent supply connection joint, and

a fourth solvent supply control valve connected between sealed solvent supply container and the second solvent supply connection joint;

wherein the prefabricated degas block comprises:

(i) a first degas block connection joint adapted to be attached to an integral block;

(ii) a second degas block connection joint adapted to be attached to an integral block;

(iii) a degas block chemical inlet conduit comprising a first degas block isolation valve and connected between the first degas block connection joint and the second degas block connection joint,

(iv) a membrane cartridge connected between the first degas block connection joint and the second degas block connection joint,

(v) a degas block chemical outlet conduit comprising a second degas block isolation valve and connected between the first degas block connection joint and the second degas block connection joint, and

(vi) a degas block control valve connected between the membrane cartridge and the second degas block connection joint; and

wherein the prefabricated filtration block comprises:

(i) a first filtration block connection joint adapted to be connected to a first integral block,

(ii) a second filtration block connection joint adapted to be connected to a second integral block, and
(iii) at least one filtration conduit connected between the first filtration block connection joint and the second filtration block connection joint, wherein the filtration conduit comprises:
a first filtration block isolation valve connected between the first filtration block connection joint and the second filtration block connection joint,
a filter connected between the first filtration block connection joint and the second filtration block connection joint, and
a second filtration block isolation valve connected between the first filtration block connection joint and the second filtration block connection joint.

- [c23] A chemical delivery system of claim 22, wherein the point of use is a vaporizer.
- [c24] A chemical delivery system of claim 22, wherein the point of use is a manufacturing process tool.
- [c25] A chemical delivery system of claim 22, wherein the point of use is an electronic fabrication tool.
- [c26] A chemical delivery system of claim 22, wherein the point of use is a semiconductor process tool.
- [c27] A method for delivering an ultrapure chemical to a point of use, which comprises:
(i) connecting a chemical container block containing an ultrapure chemical to a chemical delivery block; and
(ii) introducing the ultrapure chemical to a point of use.
- [c28] A method according to claim 27, further comprising connecting at least one integral block to said chemical delivery system.
- [c29] A method according to claim 27, wherein the integral block is selected from a recharge container block, a pressurization gas block, a purge gas block, a waste recovery block, a vacuum block, a solvent supply block, a degas block, a control

block, or a filtration block.

- [c30] A method according to claim 27, wherein the integral block is a solvent supply block or a recharge container block, and further comprising the step of delivering a solvent to an integral block prior to introducing the ultrapure chemical to a point of use.
- [c31] A method according to claim 27, wherein the solvent is selected from the group consisting of: isopropanol, tetrahydrofuran, isopropanol/tetrahydrofuran mixtures, tetraglyme, xylene, toluene, butyl acetate, benzonitrile, ethanol, hexane, octane, or mixtures thereof.
- [c32] A method according to claim 27, wherein the point of use is a vaporizer.
- [c33] A method according to claim 27, wherein the point of use is a manufacturing process tool.
- [c34] A method according to claim 27, wherein the point of use is an electronic fabrication tool.
- [c35] A method according to claim 27, wherein the point of use is an optical fiber manufacture tool.
- [c36] A method according to claim 27, wherein the point of use is a semiconductor process tool.
- [c37] A method according to claim 27, wherein the ultrapure chemical is selected from tetramethylsilane, dimethyl-dimethoxy-silane, copper(II)bis(hexafluoroacetylacetone), copper(II)hexafluoroacetylacetone, tetramethylvinylsilane, triisobutylaluminum, trimethylaminalane, triethylaminalane, dimethylethylaminalane, bis(trimethylamin)alane, dimethylaluminumhydride, titanium tetrachloride, tetrakisdimethylamino titanium (TDMAT), tetra-kisdiethylamino tantalum $(\text{Ta}(\text{Net})_4)_4$, penta-kisdiethylamino tantalum $(\text{Ta}(\text{Net})_5)_5$, tantalum pentachloride $(\text{TaCl}_5)_5$, tungsten hexocarbonyl $(\text{W}(\text{CO})_6)_6$, bisdipivaloylmethanato barium $(\text{Ba}(\text{DPM})_2)_2$, bisdipivaloylmethanato strontium $(\text{Sr}(\text{DPM})_2)_2$, bis-isopropoxy

bis(dipivaloylmethanato) titanium $Ti(I-OC_3H_7)_2DPM_2$, trimethylaluminum (TMA),

tetrakisdimethylamino zirconium ($Zr(NMe)_4$), tetrakisdiethylamino zirconium ($Zr(Net)_4$), zirconium t-Butoxide ($Zr(t-OBu)_4$), tetrakisdiethylamino hafnium ($Hf(Net)_4$), tetrakisdimethylamino hafnium ($Hf(NMe)_4$), hafnium t-Butoxide ($Hf(t-Obu)_4$), trihexafluoroacetylacetate platinum ($Pt(Hfa)_3$),

bis(ethylcyclopentadienyl) ruthenium ($EtCp_2Ru$), acetylacetate iridium

($Ir(Acac)$), dipivaloylmethane compounds, alkoxide compounds,

bis(dipivaloylmethanato) lead ($Pb(DPM)_2$), bis(dipivaloylmethanato) zirconium ($Zr(DPM)_4$), trimethyl bismuth ($BiMe_3$), tetraethylorthosilicate (TEOS),

tantalum pentaethoxide ($Ta(OEt)_5$), tetramethylcyclotetrasiloxane (TMCTS), bis(tertiary-butylamino)silane (BTBAS), trimethylphosphate (TMPO),

trimethylborate (TMB), or trimethylphosphite (TMPI).